RANK STRAND

AJP 1/72

SUMMARY SPECIFICATION

DDM/TV/BBC

LIGHTING CONTROL SYSTEM

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1. INTRODUCTION

This specification outlines Rank Strand proposals for a television lighting control system to meet the BBC's requirements for major television studios.

The system is complementary to system MMS which is offered for smaller studios. There are major similarities in the control philosophy which should make it a simple matter for operators to transfer from one system to the other. In particular the MMS facility of calling up channels and levels on a keyboard is included. For this reason keyboards for Channel, Group and Cue call-up are proposed.

The system described is believed to be unique in it's provision of integrated control for GROUPS, CUES or CHANNELS. Four CHANNEL/GROUP/CUE modules are provided, any one of which may be used for control using fader wheels.

A relatively conventional STUDIO/PRESET store playback module is also provided.

The system is based on the electronic hardware already successfully used in a number of Theatre installations. However, as DDM is a computer based system with the operational facilities determined by a software programme, the production of a television system is a relatively straightforward and predictable exercise. Thus the system is capable of considerable modification to meet the BBC's specific requirements.

2. GENERAL SYSTEM DESCRIPTION

All the functions of the system are contolled by a sophisticated mini computer. The machine used is a Digital Equipment PDP 11 which has a very good record of reliability (better than 4,000 hours M.T.B.F.).

The system cue memory is an Ampex modular ferrite core store with plug-in interchangeable modules giving a high degree of security. A module failure would only affect one third of the memory capacity on a 360 way 100 cue system.

The computer, magnetic core store, interface to contacts and mimics and the necessary power supplies are all housed in two standard 19 inch cabinets. The pin matrix for the back-up system is also included in these cabinets.

The system is designed on a modular basis with a small number of standard card types to simplify fault finding and maintenance. Considerable attention has been given to reliability with virtually all connections being wire-wrapped or crimped. All principal assemblies plug-in including the power supplies. This simplifies installation and maintenance.

3. OPERATIONAL FACILITIES

A proposal for the layout of the controls is shown on the attached drawings. This proposal is intended for discussion and Rank Strand will be happy to consider revised or additional facilities or layouts.

3.1. CHANNEL/GROUP MODULES

Each Channel Control module can be used for control of Channel level, Group level or control of a complete cue. Four control modules are provided enabling independent control of 4 groups, or channels, or cues to be achieved. The channels are called up using a keyboard which may also be used to set level information. Continuous control of the level is achieved by using a fader wheel.

3.1.1. KEYBOARD

This comprises a conventional keyboard with digits 0 - 9 and CLEAR. Additional pushes are provided as follows:

'+' increments channel number.

'-' decrements channel number.

'@' illuminates when selected and changes keyboard function so that digits may be used for level keying. When @ is selected the following functions are available:

'F' gives Full (10) level for channel.

'½' gives ½ point level for channel.

'+' followed by a digit adds that level to the existing channel level.

'-' followed by a digit subtracts that level from the existing channel level.

This form of channel call-up with level keying enables channel levels to be very rapidly set-up or modified.

The channel number selected is shown in a numerical display above the keyboard.

3.1.2. FADER WHEEL

The facilities and advantages of the fader wheel are described in more detail in TR/ASP/10/72 attached. The wheel alters the channel level directly without the need for matching or waiting for a servo fader to reach its matching level. An operator does not need to take his hand off the wheel whilst channels are being called up. (No spurious levels will be set up.)
The wheel illuminates to show white or green to indicate control of STUDIO or PRESET store.

3.1.3. ON/OFF

This push is alternate acting and switches the channel ON and OFF. If the channel is not present in the STUDIO or PRESET store when called up on the keyboard it can be switched on to a previously SET level (see Section 3.1.14) by pressing the ON/OFF push.

3.1.4. STUDIO/PRESET

This alternate acting push selects the module to control STUDIO or PRESET stores. The FADER WHEEL illuminates White or Green as appropriate.

3.1.5. RETURN

When this control is operated the channel RETURNS to the playback level if it has been modified. If it is pressed again it RETURNS to the modified level. It is useful for comparing trials with a previous level.

3.1.6. METER

A meter displays the level of the selected channel. For control of a cue the progress of the cue is shown. For group control the meter starts at mid point and moves up or down as the group is faded up or down. The sensitivity is reduced by half so that indication of movement from 0 to 10 or 10 to zero is possible.

3.1.7. CHANNEL

Channel control is selected by means of this illuminated push. It is automatically operated when the system is first switched on. It is tripped by GROUP or CUE.

3.1.8. GROUP

What is difference between Group & Cue ?

This push selects GROUP control. It illuminates when selected and is tripped by CHANNEL or CUE. When pushed, it transfers the number shown in the keyboard display to the GROUP/CUE display. The fader wheel will then control the group of channels present in the cue number selected.

What indication is there that top channel is at top recorded point after which :- 1. that channel will rise to full and 2. then group will begin to flatten out

Movement of individual channels in a group is <u>proportional</u> to their initial levels so that balance will be maintained. Raising the levels in the group above the point at which the first channel reaches full is possible until all channels in the group are at full. If the group is then faded down the channels will fade down in turn so that the original balance is regained.

Channels may be added to or subtracted from the group using the + and - pushes.

3.1.9. CUE

What is a Cue?

This push selects CUE control. It illuminates when selected and is tripped by GROUP or CHANNEL.

The function enables a complete CUE or memory to be faded-in and balanced against existing lighting using the fader wheel.

Thus a number ofchannel control modules can be used to balance a number of previously recorded memories.

3.1.10. '+', '-'.

The '+' push may be used to add a channel selected on the keyboard display at the level in Studio or Preset store (as selected for the module) to the GROUP selected.

The '-' push is used to delete the channel selected on the keyboard display from the GROUP and hence from control of the Fader Wheel.

3.1.11. GROUP/CUE NUMERICAL DISPLAY

This displays the GROUP/CUE number selected for possible control by the Fader Wheel. This number is only actually controlled by the Fader Wheel when GROUP or CUE is selected. However the number is retained for immediate use if required. Thus, for example, four cyclorama groups could be preselected for use when required by using the GROUP push to override the normal CHANNEL mode of operation.

3.1.12. MIMIC

This momentary push displays on the STUDIO or PRESET mimic diagram those channels present in the GROUP/CUE selected. Other channel mimics are inhibited.

3.1.13. RECORD

A group of channels at their current levels in the selected store can be memorised on the GROUP/CUE number by pressing the RECORD push. This push is subject to the RECORD LOCKOUT key switch.

3.1.14. SET ALL

At the start of a lighting rehearsal a common starting level may be set in all channels by using the Fader Wheel to set a single channel to the required level and then pressing SET ALL. The level in SET store is automatically changed to the level in use when control of that channel is cleared by selecting another channel number. Thus the 'current' channel level is continually updated for use when building up subsequent scenes.

3.1.15. SET A.M., CLEAR A.M.

A separate AUTO MODIFICATION store is allocated for modifications to channels after they have been recorded. Individual channels may be set at levels (including zero) in this store using SET A.M. They may be cleared individually using CLEAR A.M.

3.1.16. INDependent

This push enables control of the CHANNEL or GROUP selected to be allocated exclusively to the particular control module. Other control

modules or the main playback will have no control over the channels selected.

Normally the control of a channel is determined on a "latest instruction takes precedence" basis for both control modules and playback.

3.2. PLAYBACK MODULE

(See drawing attached)

The Playback module provides relatively conventional STUDIO and PRESET store facilities and includes a display of the last 3 cue numbers used in Studio and Preset stores. Most controls are duplicated on STUDIO and PRESET.

3.2.1. CUE SELECT

Two keyboards for cue selection in Studio and Preset stores are provided. The number selected is displayed on the numerical indicator immediately above the keyboard. The keyboard layout is identical to that provided on the Channel/Group control modules except that the level keying pushes are omitted.

3.2.2. CUE NUMBER DISPLAYS

The CUE NUMBER display immediately above the keyboard shows the last cue number selected. If it has been used a symbol displayed in front of the cue number indicates how it was used (e.g. +, -, R etc.)

Two further cue number displays are provided for Studio and Preset to show the two previous cue numbers used.

When a cue is faded from Preset to Studio store an appropriate transfer of cue numbers occurs.

3.2.3. CUT

CUT pushes are provided for STUDIO and PRESET. These take the memory selected and substitute it for the information in the appropriate store.

3.2.4. '+'

The plus push adds the memory on a "latest takes precedence basis to the appropriate store.

3.2.5. '-'

The minus push deletes the channels in the selected memory from the appropriate store.

3.2.6. '0'

The '0' push clears the STUDIO or PRESET store.

3.2.7. SEQ

The SEQUENCE push is alternate acting and illuminates when selected. It automatically increments the cue number each time CUT, +, - or RECORD is operated.

3.2.8. RECORD

This control, which is subject to the Record Interlock keyswitch, records the information from the appropriate store in the memory selected.

3.2.9. MODIFIED

This push illuminates when an unrecorded or modified state exists. When it is pressed, the STUDIO or PRESET mimic diagram will indicate those channels which have been modified.

3.2.10. RANDOM CUT

Insert Q's. this is still not as good as it should be.

This push, which illuminates when selected, enables the keyboard to be used to cut cues directly into STUDIO or PRESET stores. Any decade of cues may be selected by selecting the hundreds and tens digits and then selecting RANDOM CUT. Pressing any of the keyboard pushes will then cut the appropriate cue into STUDIO or PRESET store. Thus a random sequence

of ten cues may be cut directly into the studio or faded if cut into PRESET with a fade running.

Any lighting which is required unchanged can of course be held on a CHANNEL/GROUP module using the INDependent facility.

3.2.11. ADD A.M.

The ADD Auto Modification push selects the AUTO MOD store to modify the channel levels recalled from memory. The information is set in the store on a CHANNEL/GROUP module. It may be used to modify a memory on playback by selecting ADD A.M. before the memory is recalled. The memory is not permanently modified and any subsequent recall will be unaffected if ADD A.M. is not selected.

3.2.12. FADE SPEED CONTROLS

Two fader levers are provided to set the speeds of UP and DOWN fades in the range 1 to 60 seconds.

3.2.13. FADE PROGRESS METERS

Two meters are provided to show the progress of UP and DOWN fades. The meters show the progress of the last fade if a number of fades are running together.

3.2.14. CROSSFADE

Operation of this push takes the memory selected on CUE SELECT and crossfades it into STUDIO store. If the memory has already been used in PRESET store then the contents of PRESET store are crossfaded into STUDIO store.

3.2.15. UP FADE

This push is used to take the memory from CUE SELECT and fade it into STUDIO store, adding it to the channels already present in STUDIO. If the memory has already been used in PRESET store then the contents of PRESET store will be added to STUDIO store.

3.2.16. DOWN FADE

DOWN FADE can be used in a similar manner to UP FADE but fades out the group of channels present in CUE SELECT or PRESET store as appropriate.

NOTE CROSSFADE, UP FADE or DOWN FADE may be interrupted at any time by pressing the appropriate push. Further cues may be added to a fade by adding or subtracting cues from PRESET store.

3.3. MISCELLANEOUS CONTROLS

3.3.1. CLEAR A.M., MIMIC A.M.

These momentary contact pushes are used to clear the AUTO MOD store and to display the contents of AUTO MOD store on the PRESET Mimic.

3.3.2. MEMORY CLEAR.

Spring return key switch and push have to be operated simultaneously to clear the system memory.

3.3.3. RECORD INTERLOCK

This key switch locks out all RECORD functions on the system.

3.3.4. SYSTEM ON

Operates a remote contactor to apply power to the system.

3.3.5. CONSOLE ON

When turned OFF disables the console but maintains the "state of the board".

4. AUXILIARY CONTROLS

An auxiliary control system is provided which enables any of the 360 dimmer channels to be patched to any of 10 group master faders. The group master faders will be provided in a small free-standing box. The pin matrix will be accomodated in one of the equipment cabinets.

5. ADDITIONAL OPTIONS

A number of optional features not offered on the current tender are available for DDM/TV. These include:

(a) Studio Control.

A simple lightweight panel which enables levels to be set up, recorded and recalled from the studio floor.

(b) V.D.U. Mimic.

As an alternative to a lamp mimic a video display (C.R.T. mimic facility) is under development. It is anticipated that this will offer superior display facilities in colour at a lower price than a conventional lamp mimic in a large system.

(c) Print-out.

Plain language print-out of all cue data.

(d) Magnetic tape memory.

Long term or high capacity cue storage using magnetic tape cartridges.

(e) Remote type-in

A separate control panel with associated paper tape punch or magnetic tape recorder for preparing preliminary lighting plots away from the studio.

6. MAINTENANCE PHILOSOPHY

The DDM system is designed to be a very reliable system. Wire wrap and crimped connections are used wherever possible. The packaging is modular to permit ease in servicing and assembly and the design has minimised the number of different card types and sub-assemblies. Modular plug-in power supplies are used throughout the system.

The computer can be a very powerful aid to fault diagnosis. A special hardware test programme has been prepared which can be used in place of the normal DDM programme. This enables a very rapid check to be made on the system hardware. All mimics, contacts, faders, meters, etc. together with all the interface electronics can be checked in a matter of minutes. Using diagnostic flow charts any fault can be rapidly isolated.

A quotation is given for a recommended set of spare electronic cards, power units and other easily replaceable assemblies.

The magnetic core store is modular and in the case of a 360 way 100 cue system 3 modules are used. As all modules are independent it is recommended that a spare is not held and the system operated on a reduced number of cues until the unit is repaired or replaced. A spare module would normally be available from Rank Strand.

The PDP-11 computer has already been produced in large quantities (over 5,000 of the PDP-11 series and over 800 of the particular model used in DDM). The mean time between failures is stated to be between 4,000 and 5,000 hours. It is understood that the typical usage of the control system in a major BBC studio is about 3,000 hours per annum and that the use in TC1 may well be below this.

On this basis it is doubtful if it is worth stocking spares for the PDP 11 on site. It is suggested that the BBC rely on the Digital Equipment Corporation for service. Alternatively Rank Strand are prepared to offer an exchange service. The company already maintains a comprehensive service back-up for its theatre memory system customers including a 24 hour technical advice service.

Rank Strand will be happy to discuss their memory system maintenance services with the BBC.